REMARKS

This application has been carefully reviewed in light of the Examiner's Action dated March 12, 2004. Claims 14, 19, 21, 22 and 24 have been amended and claim 15 has been canceled without prejudice. Reconsideration and full allowance are respectfully requested.

In the March action, the Examiner objected to claim 19 for reasons not associated with patentability of the claimed subject matter. Claim 19 has been corrected as suggested by the Examiner. Applicant submits that this objection has been overcome.

The Examiner rejected claim 15 under 35 U.S.C. §112, second paragraph. Applicant notes that claim 15 has been cancelled and that the subject matter of claim 15 has been incorporated in to independent claim 14. Of note, the subject matter of claim 15 (i.e., as incorporated into claim 14) has been amended to clarify that the sheet thickness of at least one face sheet varies between the first and second positions while the overall thickness of the composite structure at those positions is the same. It is believed this rejection has been overcome.

The Examiner rejected claims 14-24 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,935,704 to Happy in view of U.S. Patent No. 5,895,699 to Corbett, et al. and in view of U.S. Patent 4,793,727 to Schamling. This rejection is respectfully traversed for the reasons set forth in detail below.

As presented, independent claim 14 is directed to a process for producing a tubular composite structure having at least one integrally reinforced section. The process comprises the steps of first applying a first face sheet onto the outside surface of a mandrel having a longitudinal axis (e.g., a cylindrical mandrel). The first face sheet is covered on its outside surface with a core layer that has a first core thickness and a second core thickness at first and second positions, respectively, relative to the longitudinal axis of the mandrel. The first and second core thicknesses are different. That is, the thickness of the core layer varies relative to positions along the length of

the mandrel. A second face sheet is applied to the outside surface of the core layer. At least one of the first face sheet and the second face sheet also varies in thickness relative to positions along the length of the mandrel. In particular, at least one of the face sheets has a first sheet thickness at the first position and a second sheet thickness at the second position. The first and second sheet thicknesses are different. The face sheets and core are applied such that the first face sheet, the core, and the second face sheet define a composite structure that has the same overall thickness at the first and second positions. After the face sheets and core are applied to the mandrel, the face sheets are cured, and the resulting composite structure is removed from the mandrel.

In order to produce a composite structure having the same thickness at first and second positions while utilizing a core that has a different core thickness at those positions, the sheet thickness of either or both the first and second face sheets is adjusted. Stated otherwise, the relative proportions of the first and second face sheets and core may be varied at the first and second positions. For example, in a position where the core thickness is reduced relative to another position, one or both of the face sheets may have an increased sheet thickness. In this instance, the stiffness and/or bearing strength of a position with a reduced core thickness may be increased without changing the outside dimensions (i.e., sidewall thickness) of the composite structure. That is, such a position within the composite structure may be internally or 'integrally' reinforced while maintaining the same thickness of other positions along the length of the structure (e.g., a constant sidewall thickness). Finally, it will be noted that by adjusting the various sheet and core thicknesses prior to curing the structure, that a single solid laminate structure may be generated upon curing the structure. Accordingly, this avoids the problems associated with bonding materials (e.g., reinforcements) to previously cured composite structures. See e.g., Application pg 3, lines 12-21.

As claimed, independent claim 14 provides a method for forming a single integrally reinforced composite structure wherein the thickness of at least one of the first and second face

sheets varies in relation to a variation in the core thickness between first and second positions to maintain the same overall thickness of the structure at the first and second positions.

As presented, Happy is directed to a method for forming an elongated filament-wound object (e.g. a pole) having a non-uniform wall thickness. See column 1, lines 9-19. In this regard, the elongated filament-wound object described by Happy has a sidewall thickness that is greater at its base than at its tip. This increased thickness results from the presence of additional layers of filament-wound reinforcements at the base of the object. See for example column 3, lines 8-14. Happy fails to disclose the use or the desirability of utilizing an intermediate core disposed between first and second face sheets to increase the stiffness of a resulting composite structure. Accordingly, Happy fails to disclose or suggest a method for forming a single integrally reinforced composite structure wherein the thickness of at least one face sheet varies in relation to variations in core thickness between first and second positions in order to maintain the same overall thickness of the structure at the first and second positions.

Corbett discloses a method for reducing core crush in a honeycomb structure by utilizing a peripheral tie down ply to maintain the core of the composite laminate at a desired location during curing. Specifically, the tie down ply is applied to a chamfered edge of a core section 106 and sandwiched between two face sheets 102 in a region where the core section is not present. However, Corbett fails to disclose a composite structure having a first and second positions along its length wherein the thickness of at least one face sheet varies in relation to variations in core thickness between first and second positions in order to maintain the same overall thickness of the structure at the first and second positions. As shown in Figure 6 of Corbett, the thickness of the composite structure varies in direct relation to the thickness of the core section 106. In particular, as the thickness of the core section 106 decreases, the overall thickness of the composite structure also decreases. This teaches away from the claimed subject matter of claim 14. As presented, Corbett

fails to disclose a single composite structure wherein the relative proportions of face sheets and a core material making up that structure may be varied between first and second positions along the length of the structure to provide one or more integrally reinforced sections while the overall thickness of the structure at those positions is the same.

Schmaling is directed to a joint utilized to interconnect separate preformed composite sandwich panels. See Col. 1, lines 22-35. That is, Schmaling provides a joint for interconnecting two composite panels after those panels are cured. Specifically, a first layer 12 of a first article 3 overlaps a first layer 24 of the second article 6 to form a first overlap 45. Likewise a second layer 27 of the second article 6 overlaps the second layer 18 of the first article to form a second overlap 57. These various layers of the separate panels are then bonded together. See Col. 3 lines 53-56. Accordingly, Schmaling fails to disclose or suggest forming composite structure wherein the thickness of at least one of the first and second face sheets varies in relation to a variation in the core thickness between first and second positions to maintain the same overall thickness of the structure at the first and second positions and curing the structure to form a single integrally reinforced composite structure.

The combination proposed by the Examiner does not yield the subject matter of claim 14. In this regard, Happy teaches a method for filament-winding a composite structure that does not include a core structure and which has a non-uniform wall thickness along its length, Corbett teaches a method for curing a composite structure having an overall thickness that changes in direct relation to the thickness of a core disposed between opposing face sheets, and Schmaling teaches a method for adjoining composite panels after those panels are formed. Therefore, the proposed combination, even if it was proper, does not yield a method for forming a single integrally reinforced composite structure wherein 1) the relative proportions of first and second face sheets and a core material (i.e., as applied to a mandrel) vary between first and second positions while the overall thickness of the

structure at the first and second positions is the same; and 2) curing the face sheets to form a single composite structure. Accordingly, Applicant submits that independent claim 14 and its dependent claims are allowable as presented and respectfully requests that this rejection be withdrawn.

Applicant also submits that the combination proposed be the Examiner is improper. Happy is directed towards production of utility poles while Corbett and Schmaling are directed toward composite sandwich panels for use in aerospace applications. It is unclear why one addressing aerospace concerns would be motivated to seek the disclosure of Happy. Likewise, it is unclear why one addressing utility pole construction would seek the disclosures of Corbett and Schmaling. In particular, Happy is directed to a filament wound pole that does not utilize a core structure and Corbett and Schmaling are directed to composite panels that utilize a core structure and which do not utilize a filament winding process. Therefore applicant submits that Happy is directed to a problem exclusive of the problems addressed by Corbett and Schmaling and there is no motivation to make the combination suggested by the Examiner.

Moreover, it is unclear that Happy, Corbett and Schmaling could be operatively combined. Happy discloses a method for producing a filament wound pole that does not include a core material. Corbett and Schmaling are directed to a method for curing composite honeycomb structures to reduce core crush and a joint for adjoining composite panels that include core structures, respectively. There is simply no motivation to combine the cited references.

Furthermore, the combination of Corbett and Schmaling would destroy the functionality of the Corbett patent. As noted above, the Corbett patent utilizes a tie down ply that is applied to a chamfered edge of a core section of a composite panel and that is sandwiched between face sheets where no core is present. The joint of Schmaling requires that first and second face sheets be separated by a core section and/or a space in order to form overlap sections for joint bonding purposes. Accordingly, modifying Corbett to include a core section or space between the face sheets

to form a joint would prevent the sandwiching the tie down ply between face sheets where no core is present. Accordingly, there is a disincentive to make the combination suggested by the Examiner.

Based upon the foregoing, Applicants believe that all pending claims are in condition for allowance and such disposition is respectfully requested. In the event that a telephone conversation would further prosecution and/or expedite allowance, the Examiner is invited to contact the undersigned.

Respectfully submitted,

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